

Robert Y. Lewis

CONTACT INFO

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EMPLOYMENT

- 2021 – Present **Brown University**, Providence, RI, USA
Lecturer, Computer Science
- 2018 – 2021 **Vrije Universiteit Amsterdam**, The Netherlands
Postdoc, Theoretical Computer Science
- Summer 2016 **Wolfram Research**, Champaign, IL, USA
Intern, Mathematica Algorithms R&D
- 2010 – 2012 **St. Agnes Academy**, Houston, TX, USA
Secondary School Teacher
10th grade geometry, 11th and 12th grade pre-calculus, 12th grade AP Calculus AB

EDUCATION

- 2012 – 2018 **Carnegie Mellon University**, Pittsburgh, PA, USA
PhD, Pure and Applied Logic, 2018
MS, Mathematics, 2015
MS, Logic, Computation, and Methodology, 2014
- Summer 2015 **University of Newcastle**, NSW, Australia
Visiting student, [CARMA](#) Priority Research Centre
- 2006 – 2010 **Rice University**, Houston, TX, USA
BA, Mathematics and Philosophy

PEER REVIEWED PUBLICATIONS

Formalized functional analysis with semilinear maps

Frédéric Dupuis, Robert Y. Lewis, and Heather Macbeth
Interactive Theorem Proving (ITP 2022)

A bi-directional extensible interface between Lean and Mathematica

Robert Y. Lewis and Minchao Wu
Journal of Automated Reasoning 66(1), 2022

Formalizing the ring of Witt vectors

Johan Commelin and Robert Y. Lewis
10th ACM SIGPLAN International Conference on Certified Programs and Proofs (CPP 2021)

Normalizing casts and coercions

Robert Y. Lewis and Paul-Nicolas Madelaine

Practical Aspects of Automated Reasoning (PAAR 2020)

Maintaining a library of formal mathematics

Floris van Doorn, Gabriel Ebner, and Robert Y. Lewis

13th Conference on Intelligent Computer Mathematics (CICM 2020)

The Lean mathematical library

The mathlib Community

9th ACM SIGPLAN International Conference on Certified Programs and Proofs (CPP 2020), pp. 367-381. 2020

This paper describes a collective project with many contributors. I am a maintainer of the project and wrote much of this paper.

Formalizing the solution to the cap set problem

Sander Dahmen, Johannes Hölzl, and Robert Y. Lewis

Interactive Theorem Proving (ITP 2019)

A formal proof of Hensel's lemma over the p -adic integers

Robert Y. Lewis

8th ACM SIGPLAN International Conference on Certified Programs and Proofs (CPP 2019)

An extensible ad hoc interface between Lean and Mathematica

Robert Y. Lewis

Proof eXchange for Theorem Proving 2017 (EPTCS)

A heuristic prover for real inequalities (journal version)

Jeremy Avigad, Robert Y. Lewis, and Cody Roux

Journal of Automated Reasoning 56(3), pp. 367-386. 2016

A heuristic prover for real inequalities

Jeremy Avigad, Robert Y. Lewis, and Cody Roux

Interactive Theorem Proving (ITP 2014)

Energy-minimizing unit vector fields

Leobardo Rosales, Robert Y. Lewis, et al

Involve 3(4), pp. 435-450. 2010

BOOKS AND THESES

Mathematics in Lean (a tutorial on the Lean theorem prover for mathematicians)

Jeremy Avigad, Kevin Buzzard, Robert Y. Lewis, and Patrick Massot

Under development; available [online](#)

Logic and Proof (a textbook using the Lean theorem prover)

Jeremy Avigad, Robert Y. Lewis, and Floris van Doorn

Available freely in [interactive](#) and [static](#) versions

Two Tools for Formalizing Mathematical Proofs (dissertation)

Robert Y. Lewis

Certified Feb 16, 2018

Polya: A Heuristic Procedure for Reasoning with Real Inequalities (MS thesis)

Robert Y. Lewis

Certified Dec 11, 2014

TEACHING

Brown:

- Fall 2022 **Formal Proof and Verification**
- Fall 2022 **Compilers and Program Analysis**
- Spring 2022 **Discrete Structures and Probability**
- Fall 2021 **Computing Foundations: Program Organization** (second instructor)
- Fall 2021 **Formal Proof and Verification**

VU Amsterdam:

- Spring 2021 **Logic and Modeling** (online)
- Fall 2020 **Introduction to Computer Science (theory week)** (online)
- Spring 2020 **Logic and Modeling** (online)
- Spring 2019 **Logic and Modeling**
- Spring 2018 **Logic and Modeling** (teaching assistant)

Carnegie Mellon:

- Fall 2016 **Logic and Mathematical Inquiry**
- Spring 2015 **Nature of Mathematical Reasoning**
- Fall 2014 **Models and Methods of Optimization** (teaching assistant)
- Summer 2014 **Nature of Mathematical Reasoning**
- Spring 2014 **Undecidability and Incompleteness** (grader and guest lecturer)
- Fall 2013 **Formal Logic** (grader and guest lecturer)

Previous:

- 2010 – 2012 **Geometry, Pre-calculus, AP Calculus AB** (St. Agnes Academy)
- 2007 – 2010 **Honors Calculus III/IV, Honors Linear Algebra** (Rice, grader)

THESIS STUDENTS AND INTERNS

Brown:

- 2022 – 2023 Benjamin Ryjikov (MS thesis)
- 2022 Mark Lavrentyev (BS thesis)

VU Amsterdam:

- 2021 Polina Boneva (BS thesis)
- 2019 Kevin Kappelmann (MS intern)
- 2019 Paul-Nicolas Madelaine (MS intern)
- 2018 – 2019 Markos Dermitzakis (BS thesis)
- 2018 – 2019 Phillip Lippe (MS research assistant)
- 2018 – 2019 Miko Kuijn (MS thesis)
- 2018 Pablo Le Hénaff (MS intern)

AWARDS, GRANTS, AND HONORS

- 2022 Microsoft Research curriculum development grant
- 2021 Lorentz Center, hosting and organization for 45 person workshop
- 2020 Microsoft Research on Azure grant
- 2019 – 2023 Senior Collaborator, [Lean Forward](#) NWO Vidi grant
- 2017 [Laboratory of Symbolic and Educational Computation](#) research fellowship
- 2017 [Future Faculty](#), Eberly Center for Teaching Excellence & Educational Innovation
- 2015 – 2016 William S. Dietrich II [Presidential PhD Fellowship](#)
- 2014 Honorable Mention, NSF Graduate Research Fellowship Program

SERVICE

- 2022 Organizer, [Machine-Checked Mathematics](#) workshop
- 2022 [SC²](#) Workshop Program Committee
- 2022 [Intelligent Computer Mathematics](#) Conference Program Committee
- 2021 Organizer, [Lean Together 2021](#) workshop
- 2020 Proposal assessor, [NWO Open Domain Science – XS](#) scheme
- 2020 [Certified Programs and Proofs 2021](#) Conference Program Committee
- 2020 Organizer, [Formal Methods in Mathematics / Lean Together 2020](#) workshop
- 2019 – Maintainer, Lean [mathlib](#) library
- 2019 Organizer, [Lean Together 2019](#) workshop
- 2018 Organizer, [ICMS](#) session on [Formal and Informal Mathematical Corpora](#)
- 2018 [Artificial Intelligence and Symbolic Computation](#) Conference Program Committee
- 2015, 2016 CMU Philosophy Dept. Graduate Admissions Committee
- 2015 CMU Philosophy Dept. 30th Anniversary Conference Planning Committee
- 2014 – 2018 Founding member, CMU chapter of [Minorities and Philosophy](#)
- 2013 – 2017 Organizer, CMU Philosophy Dept. Graduate Research Sharing Forum
- 2011 – 2012 Coach and sponsor, St. Agnes Academy Engineering/Robotics Team
- 2008 – 2010 Coordinator and tutor, SRC Society of Academic Fellows, Rice University

SELECTED PRESENTATIONS

Teaching the theory and practice of proof assistants with Lean

- [Formal Methods in Education tutorial series](#), virtual. 08/2022.

Software development meets math: Lean and its mathematical library

- [Boston University POPV seminar](#), Boston, MA, USA. 05/2022.

Metaprogramming and tactic writing and Dealing with numbers

- [Lean for the Curious Mathematician](#), virtual. 07/2020.

Simplifying casts and coercions

- [PAAR 2020: Practical Aspects of Automated Reasoning](#), virtual. 06/2020.

The Lean mathematical library

- [CPP 2020: Certified Programs and Proofs](#), New Orleans, LA, USA. 01/2020.

Formalizing the solution to the cap set problem

- [ITP 2019: Interactive Theorem Proving](#), Portland, OR, USA. 09/2019.
- [Vietnam-USA Joint Mathematical Meeting](#), Quy Nhon, Vietnam. 06/2019.
- [CARMA Workshop on Computer-Aided Proof](#), Newcastle, NSW, Australia. 06/2019. (Invited speaker.)

A formal proof of Hensel's lemma over the p -adic integers

- [CPP 2019: Certified Programs and Proofs](#), Cascais, Portugal. 01/2019.
- [Lean Together 2019](#), Amsterdam, The Netherlands. 01/2019.

A heuristic method for formally verifying real inequalities

- [Matryoshka 2018](#), Amsterdam, The Netherlands. 06/2018.
- [Hales60](#), Pittsburgh, PA, USA. 06/2018. (Invited speaker.)

Toward AI for Lean, via metaprogramming

- [AITP 2018: Artificial Intelligence in Theorem Proving](#), Aussois, France. 03/2018.

The Lean theorem prover, for mathematicians

- Western University Mathematics Dept. Foundations Seminar, London, ON, Canada. 12/2017.

An extensible ad hoc interface between Lean and Mathematica

- [ICMS 2018: International Congress on Mathematical Software](#), South Bend, IN, USA. 07/2018.
- [PxTP 2017: Proof eXchange for Theorem Proving](#), Brasília, Brazil. 09/2017.
- [Wolfram Technology Conference](#), Champaign, IL, USA. 10/2016.

Automation and computation in the Lean theorem prover

- [HaTT: Hammers for Type Theory](#), IJCAR, Coimbra, Portugal. 07/2016.
- [AITP 2016: Artificial Intelligence in Theorem Proving](#), Obergurgl, Austria. 04/2016.
- TU München Logic and Verification Seminar, Munich, Germany. 03/2016.

Algebra and analysis in the Lean theorem prover

- [MAP 2016: Effective Analysis](#), Marseille, France. 01/2016.

Dependent types and the algebraic hierarchy

- [Workshop on Mathematics and Computation](#), Newcastle, NSW, Australia. 06/2015.

A heuristic prover for real inequalities

- [ITP 2014: Interactive Theorem Proving](#), Vienna, Austria. 07/2014.
- [6th Podlasie Conference on Mathematics](#), Bialystok, Poland. 07/2014.
- CMU Graduate Research Sharing Forum, Pittsburgh, PA. 12/2013.

Energy-minimizing vector fields of unit length

- Rice University VIGRE Summer Seminar, Houston, TX. 07/2009.